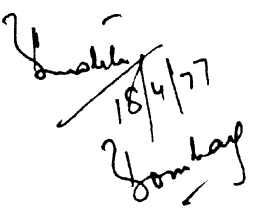
PETER TOMPKINS
CHRISTOPHER BIRD

THE SECRET LIFE OF PLANTS



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PART 5 THE RADIANCE OF LIFE

Introduction

Short of Aphrodite, there is nothing lovelier on this planet than a flower, nor more essential than a plant. The true matrix of human life is the green sward covering mother earth. Without green plants we would neither breathe nor eat. On the under-surface of every leaf a million movable lips are engaged in devouring carbon dioxide and expelling oxygen. All together, twenty-five million square miles of leaf surface are daily engaged in this miracle of photosynthesis, producing oxygen and food for man and beast.

Of the 375 billion tons of food we consume each year the bulk comes from plants, which synthesize it out of air and soil with the help of sunlight. The remainder comes from animal products, which in turn are derived from plants. All the food, drink, intoxicants, drugs and medicines that keep man alive and, if properly used, radiantly healthy are ours through the sweetness of photosynthesis. Sugar produces all our starches, fats, oils, waxes, cellulose. From crib to coffin, man relies on cellulose as the basis for his shelter, clothing, fuel, fibres, basketry, cordage, musical instruments, and the paper on which he scribbles his philosophy. The abundance of plants profitably used by man is indicated by nearly six hundred pages in Uphof's *Dictionary of Economic Plants*. Agriculture – as the economists agree – is the basis for a nation's wealth.

Instinctively aware of the aesthetic vibrations of plants, which are spiritually satisfying, human beings are happiest and most comfortable when living with flora. At birth, marriage, death, blossoms are prerequisites, as they are at mealtime or festivities. We give plants and flowers as tokens of love, of friendship, or homage, and of thanks for hospitality. Our houses are adorned with gardens, our cities with parks, our nations with national preserves. The first thing a woman does

to make a room liveable is to place a plant in it or a vase of fresh cut flowers. Most men, if pressed, might describe paradise, whether in heaven or on earth, as a garden filled with luxuriant orchids, uncut, frequented by a nymph or two.

Aristotle's dogma that plants have souls but no sensation lasted through the Middle Ages and into the eighteenth century, when Carl von Linné, grandfather of modern botany, declared that plants differ from animals and humans only in their lack of movement, a conceit which was shot down by the great nineteenth-century botanist Charles Darwin, who proved that every tendril has its power of independent movement. As Darwin put it, plants 'acquire and display this power only when it is of some advantage to them'.

At the beginning of the twentieth century a gifted Viennese biologist with the Gallic name of Raoul Francé put forth the idea, shocking to contemporary natural philosophers, that plants move their bodies as freely, and gracefully, as the most skilled animal or human, and that the only reason we don't appreciate the fact is that plants do so at a much slower pace than humans.

The roots of plants, said Francé, burrow inquiringly into the earth, the buds and twigs swing in definite circles, the leaves and blossoms bend and shiver with change, the tendrils circle questingly and reach out with ghostly arms to feel their surroundings. Man, said Francé, merely thinks plants motionless and feelingless because he will not take the time to watch them.

Poets and philosophers such as Johann Wolfgang von Goethe and Rudolf Steiner, who took the trouble to watch plants, discovered that they grow in opposite directions, partly burrowing into the ground as if attracted by gravity, partly shooting up into the air as if pulled by some form of antigravity, or levity.

Wormlike rootlets, which Darwin likened to a brain, burrow constantly downward with thin white threads, crowding themselves firmly into the soil, tasting it as they go. Small hollow chambers in which a ball of starch can rattle indicate to the root tips the direction of the pull of gravity.

When the earth is dry, the roots turn towards moister ground, finding their way into buried pipes, stretching, as in

the case of the lowly alfalfa plant, as far as forty feet, developing an energy that can bore through concrete. No one has yet counted the roots of a tree, but a study of a single rye plant indicates a total of over thirteen million rootlets with a combined length of 380 miles. On these rootlets of a rye plant are fine root hairs estimated to number some fourteen billion with a total length of 6,600 miles, almost the distance from pole to pole.

As the special burrowing cells are worn out by contact with stones, pebbles, and large grains of sand, they are rapidly replaced, but when they reach a source of nourishment they die and are replaced by cells designed to dissolve mineral salts and collect the resulting elements. This basic nourishment is passed from cell to cell up through the plant, which constitutes a single unit of protoplasm, a watery or gelatinous substance considered the basis of physical life.

The root is thus a waterpump, with water acting as a universal solvent, raising elements from root to leaf, evaporating and falling back to earth to act once more as the medium for this chain of life. The leaves of an ordinary sunflower will transpire in a day as much water as a man perspires. On a hot day a single birch can absorb as much as four hundred quarts, exuding cooling moisture through its leaves.

No plant, says Francé, is without movement, all growth is a series of movements; plants are constantly preoccupied with bending, turning and quivering. He describes a summer day with thousands of polyplike arms reaching from a peaceful arbor, trembling, quivering in their eagerness for new support for the heavy stalk that grows behind them. When the tendril, which sweeps a full circle in sixty-seven minutes, finds a perch, within twenty seconds it starts to curve around the object, and within the hour has wound itself so firmly it is hard to tear away. The tendril then curls itself like a corkscrew and in so doing raises the vine to itself.

A climbing plant which needs a prop will creep towards the nearest support. Should this be shifted, the vine, within a few hours, will change its course into the new direction. Can the plant see the pole? Does it sense it in some unfathomed way? If a plant is growing between obstructions and cannot

see a potential support it will unerringly grow towards a hidden support, avoiding the area where none exists.

Plants, says Francé, are capable of *intent*: they can stretch towards, or seek out, what they want in ways as mysterious as the most fantastic creations of romance.

Far from existing inertly, the inhabitants of the pasture – or what the ancient Hellenes called *botane* – appear to be able to perceive and to react to what is happening in their environment at a level of sophistication far surpassing that of humans.

The sundew plant will grasp at a fly with infallible accuracy, moving in just the right direction towards where the prey is to be found. Some parasitical plants can recognize the slightest trace of the odour of their victim, and will overcome all obstacles to crawl in its direction.

Plants seem to know which ants will steal their nectar, closing when these ants are about, opening only when there is enough dew on their stems to keep the ants from climbing. The more sophisticated acacia actually enlists the protective services of certain ants which it rewards with nectar in return for the ants' protection against other insects and herbivorous mammals.

Is it chance that plants grow into special shapes to adapt to the idiosyncrasies of insects which will pollinate them, luring these insects with special colour and fragrance, rewarding them with their favourite nectar, devising extraordinary canals and floral machinery with which to ensnare a bee so as to release it through a trap door only when the pollination process is completed?

Is it really nothing but a reflex or coincidence that a plant such as the orchid *Trichoceros parviflorus* will grow its petals to imitate the female of a species of fly so exactly that the male attempts to mate with it and in so doing pollinates the orchid? Is it pure chance that night-blossoming flowers grow white the better to attract night moths and night-flying butterflies, emitting a stronger fragrance at dusk, or that the carrion lily develops the smell of rotting meat in areas where only flies abound, whereas flowers which rely on the wind to cross-pollinate the species do not waste energy on making themselves beautiful, fragrant or appealing to insects, but remain relatively unattractive?

To protect themselves plants develop thorns, a bitter taste, or gummy secretions that catch and kill unfriendly insects. The timorous *Mimosa pudica* has a mechanism which reacts whenever a beetle or an ant or a worm crawls up its stem towards its delicate leaves: as the intruder touches a spur the stem raises, the leaves fold up, and the assailant is either rolled off the branch by the unexpected movement or is obliged to draw back in fright.

Some plants, unable to find nitrogen in swampy land, obtain it by devouring living creatures. There are more than five hundred varieties of carnivorous plants, eating any kind of meat from insect to beef, using endlessly cunning methods to capture their prey, from tentacles to sticky hairs to funnel-like traps. The tentacles of carnivorous plants are not only mouths but stomachs raised on poles with which to seize and eat their prey, to digest both meat and blood, and leave nothing but a skeleton.

Insect-devouring sundews pay no attention to pebbles, bits of metal, or other foreign substances placed on their leaves, but are quick to sense the nourishment to be derived from a piece of meat. Darwin found that the sundew can be excited when a piece of thread is laid on it weighing no more than 1/78,000 of a grain. A tendril, which next to the rootlets constitutes the most sensitive portion of a plant, will bend if a piece of silk thread is laid across it weighing but .00025 of a gramme.

The ingenuity of plants in devising forms of construction far exceeds that of human engineers. Man-made structures cannot match the supple strength of the long hollow tubes that support fantastic weights against terrific storms. A plant's use of fibres wrapped in spirals is a mechanism of great resistance against tearing not yet developed by human ingenuity. Cells elongate into sausages or flat ribbons locked one to the other to form almost unbreakable cords. As a tree grows upward it scientifically thickens to support the greater weight.

The Australian eucalyptus can raise its head on a slim trunk above the ground 480 feet, or as high as the Great Pyramid of Cheops, and certain walnuts can hold a harvest of

100,000 nuts. The Virginia knotweed can tie a sailor's knot which is put to such a strain when it dries that it snaps, hurling the seeds to germinate as far as possible from mother.

Plants are even sentient to orientation and to the future. Frontiersmen and hunters in the prairies of the Mississippi Valley discovered a sunflower plant, *Silphium laciniatum*, whose leaves accurately indicate the points of the compass. Indian liquorice, or *Arbrus precatorius*, is so keenly sensitive to all forms of electrical and magnetic influences it is used as a weather plant. Botanists who first experimented with it in London's Kew Gardens found in it a means for predicting cyclones, hurricanes, tornadoes, earthquakes and volcanic eruptions

So accurate are alpine flowers about the seasons, they know when spring is coming and bore their way up through lingering snowbanks, developing their own heat with which to melt the snow.

Plants which react so certainly, so variously, and so promptly to the outer world, must, says Francé, have some means of communicating with the outer world, something comparable or superior to our senses. Francé insists that plants are constantly observing and recording events and phenomena of which man – trapped in his anthropocentric view of the world, subjectively revealed to him through his five senses – knows nothing.

Whereas plants have been almost universally looked upon as senseless automata, they have now been found to be able to distinguish between sounds inaudible to the human ear and colour wavelengths such as infra-red and ultra-violet invisible to the human eye; they are specially sensitive to X-rays and to the high frequency of television.

The whole vegetal world, says Francé, lives responsive to the movement of the earth and its satellite moon, to the movement of the other planets of our solar system, and one day will be shown to be affected by the stars and other cosmic bodies in the universe.

As the external form of a plant is kept a unit and restored whenever part of it is destroyed, Francé assumes there must be some conscious entity supervising the entire form, some

intelligence directing the plant, either from within, or from without.

Over half a century ago Francé, who believed plants to be possessed of all the attributes of living creatures including 'the most violent reaction against abuse and the most ardent gratitude for favours', could have written a *Secret Life of Plants*, but what he had already put into print was either ignored by the establishment or considered heretically shocking. What shocked them most was his suggestion that the awareness of plants might originate in a supramaterial world of cosmic beings to which, long before the birth of Christ, the Hindu sages referred as 'devas', and which, as fairies, elves, gnomes, sylphs and a host of other creatures, were a matter of direct vision and experience to clairvoyants among the Celts and other sensitives. The idea was considered by vegetal scientists to be as charmingly jejune as it was hopelessly romantic.

It has taken the startling discoveries of several scientific minds in the 1960s to bring the plant world sharply back to the attention of mankind. Even so there are sceptics who find it hard to believe that plants may at last be the bridesmaids at a marriage of physics and metaphysics.

Evidence now supports the vision of the poet and the philosopher that plants are living, breathing, communicating creatures, endowed with personality and the attributes of soul. It is only we, in our blindness, who have insisted on considering them automata. Most extraordinary, it now appears that plants may be ready, willing, and able to cooperate with humanity in the Herculean job of turning this planet back into a garden from the squalor and corruption of what England's pioneer ecologist William Cobbett would have called a 'wen'.

PART I

MODERN RESEARCH

I

Plants and extrasensory perception

The dust-grimed window of the office building facing New York's Times Square reflected, as through a looking-glass, an extraordinary corner of wonderland. There was no White Rabbit with waistcoat and watch chain, only an elfin-eared fellow called Backster with a galvanometer and a house-plant called *Dracaena massangeana*. This particular adventure in wonderland started in 1966. Clee Backster, America's foremost lie-detector examiner, had been up all night in his school for polygraph examiners, teaching the art of lie-detection to policemen and security agents from all over the world. On an impulse he decided to attach the electrodes of one of his lie-detectors to the leaf on his dracaena – a tropical plant with large leaves and a dense cluster of small flowers, known as the dragon-tree because of the popular myth that its resin yields dragon's blood. He was curious to see if the leaf would be affected by water poured on its roots, and if so, how, and how soon.

As the plant thirstily sucked water up its stem, the galvanometer, to Backster's surprise, did not indicate less resistance as might have been expected by the greater electrical conductivity of the moister plant. The pen on the graph paper, instead of trending upwards, was trending downwards, with a lot of saw-tooth motion on the tracing. It was in fact showing a reaction similar to that of a human being experiencing a brief emotional stimulus.

A galvanometer is that part of a polygraph lie-detector which, when a weak current of electricity is run through a live human being, will cause a needle to move, or a pen to make a tracing on a moving graph of paper, in response to mental images, or the slightest surges of emotion, as they occur to the human guinea pig. It was invented at the end of the eighteenth

century by a Viennese priest, Father Maximilian Hell, S.J., who was court astrologer to the Empress Maria Theresa; but was named after Luigi Galvani, the Italian physicist and physiologist belatedly credited with discovering animal electricity. The galvanometer is now used in conjunction with an electric circuit called a Wheatstone Bridge, in honour of the English physicist and inventor of the automatic telegraph, Sir Charles Wheatstone.

In simple terms, the bridge balances resistance, so that the human body's electrical potential can be measured as it fluctuates under the stimulus of thought and emotion. The standard police procedure is to feed carefully structured questions to a suspect and watch for those which cause the needle to jump. Veteran examiners, such as Backster, claim they can identify deception from the patterns they produce on the graph. The most effective way to trigger a reaction in a human being strong enough to make the galvanometer jump, is to threaten his well-being. Backster decided to do exactly that to the plant. He dipped a leaf of the dracaena in his cup of hot coffee; there was no reaction to speak of on the meter.

He studied the problem several minutes, then conceived a worse threat: he would burn the actual leaf to which the electrodes were attached. The very instant he got the picture of flame in his mind, and before he could move for a match, there was a dramatic change in the tracing pattern on the graph in the form of a prolonged upward sweep of the recording pen. Backster had not moved, either towards the plant or towards the recording machine. Could the plant have been reading his mind?

He left the room to fetch some matches and returned to find another sudden surge had registered on the chart. Reluctantly he set about burning the leaf. This time there was a lower peak of reaction on the graph. Later, as he went through the motions of pretending he would burn the leaf, there was no reaction whatsoever. Mysteriously the plant appeared to be able to differentiate between real and pretended intent. In order to establish what was happening and how, he now began on a meticulous investigation of the phenomenon he had just

witnessed. His first move was to make sure he had not overlooked any logical explanation for the occurrence. Was there something extraordinary about the plant? About him? About the particular polygraph instrument? Enlisting collaborators, he went on to use other plants and other instruments in other locations all over the country. More than twenty-five different varieties of plants and fruits were tested, including lettuces, onions, oranges and bananas. The observations, all bearing a resemblance, seemed to demand a new view of life.

At first he considered that his plants' capacity for picking up his intention must be some form of extrasensory perception; then he quarrelled with the term. ESP is held to mean perception above and beyond varieties of the established five sensory perceptions of touch, sight, sound, smell and taste. As plants give no evidence of eyes, ears, nose, or mouth, and as botanists since Darwin's time have never credited them with a nervous system, Backster concluded that the perceiving sense must be more basic. This led him to hypothesize that the five senses in humans might be limiting factors overlaying some kind of primary perception, possibly common to all nature. 'Maybe plants see better *without* eyes,' Backster surmised: 'Better than humans do with them.' With the five basic senses, humans have the choice of perceiving, poorly perceiving, or not perceiving, at will. 'If you don't like the look of something,' said Backster, 'you can look the other way, or not look at all. If everyone were to be in everyone else's mind all the time it would be chaos.'

To discover what his plants could sense or feel, Backster enlarged his office, and set about creating a proper scientific laboratory. During the next few months, chart after chart was obtained from all sorts of plants. The phenomenon appeared to persist even if the plant leaf was detached from the plant, or if it was trimmed to the size of the electrodes; amazingly, even if a leaf was shredded and redistributed between the electrode surface there was still a reaction on the chart. The plants reacted not only to threats from human beings, but also to unformulated threats such as the sudden appearance of a dog in the room, or of a person who did not wish them well. Backster was able to demonstrate that the

plants reacted to one particular individual, then conventional polygraph tests would be administered and the murder might be rapidly solved.

The workers began to parade through the adjoining office and the plants gave no unusual response. The greatest reaction came from the seasoned law enforcement officers when Backster requested them to place the plants in safe custody for the night as 'the sole witnesses to the homicide'. The next day the plants still gave no reaction; but neither they nor Backster could be faulted. The criminal turned out not to have been a worker at the factory.

In another series of observations, Backster noted that a special bond of affinity appeared to be created between a plant and its keeper, even though they were not in close proximity. With the use of synchronized stop-watches, he was able to note that his plants continued to react to his thoughts and attention from the next room, from down the hall, even from several buildings away.

He was even able to establish that his plants had shown positive signs of response at the very moment he had decided to return to New York from a fifteen mile trip to New Jersey. Whether it was relief, or welcome, Backster could not tell. In his office the original dracaena, the plant from which all his observations stemmed, showed a corresponding reaction on the chart at the very time that he was projecting a slide of it when he was away on a lecture tour.

Once attuned to a particular person, plants appeared to be able to maintain a link with that person, wherever he might be, even among thousands of people. This was shown one New Year's Eve in New York City when Backster went out into the bedlam of Times Square armed with a notebook and stop-watch. Mingling with the crowd, he noted his various actions such as walking, running, going underground by way of subway stairs, nearly getting run over, or having a mild fracas with a newspaper seller. Back at the laboratory, he found that each of three plants, monitored independently, showed similar reactions to his slight emotional adventures.

Backster has no idea what kind of energy wave may carry man's thoughts or internal feelings to a plant. He has tried to

screen a plant by placing it in a Faraday cage as well as in a lead container. Neither shield appeared in any way to block or jam the communication channel linking the plant to the human being. The carrier wave equivalent, whatever it might be, Backster concluded, must somehow operate beyond the electromagnetic spectrum, and from the macrocosm down to the microcosm.

One day when Backster happened to cut his finger and dabbed it with iodine, the plant that was being monitored on the polygraph immediately reacted, apparently to the death of some cells in Backster's finger. Though it might have been reacting to his emotional state at the sight of his own blood, or to the stinging of the iodine, Backster was beginning to find a recognizable pattern in the graph when a plant was witnessing the death of some living tissue. Could the plant, he wondered, be sensitive on a cellular level all the way down to the death of individual cells in its environment?

On another occasion the typical graph appeared as Backster was preparing to eat a bowl of yogurt. This puzzled him till he realized there was a chemical preservative in the jam he was mixing into the yogurt that was terminating some of the live yogurt bacilli. Another puzzling pattern on the chart was finally explained when it was realized the plants were reacting to boiling water which was killing bacteria as it ran down the waste-pipe of the sink.

In order to explore the idea that some sort of cellular consciousness must be common to all life, Backster found a way of attaching electrodes to infusions of all sorts of single-celled creatures such as amoebae, paramecium yeast, mould cultures, scrapings from the human mouth, bloodcells, and even spermatozoa. All were subject to being monitored on the polygraph with charts just as interesting as those produced by the plants. Sperm cells turned out to be surprisingly canny in that they seemed to be capable of identifying and reacting to the presence of their own donor, ignoring the presence of other males. Such observations seem to imply that some sort of total memory may go down to the single cell, and by inference, that the brain may be just a switching mechanism, not necessarily a memory storage organ.

'Sentience,' says Backster, 'does not seem to stop at the cellular level. It may go down to the molecular and beyond. All sorts of things which have been conventionally considered to be inanimate may have to be re-evaluated.'

Convinced he was on the track of a phenomenon of major importance to science, Backster was anxious to publish his findings in a scientific journal so that other scientists could check his results. But personal involvement in his experiments and even prior knowledge of the timing of an experiment was often enough to tip off a plant into non-cooperation. He realized that he would have to devise an experiment in which all human involvement was removed. The entire process would have to be automated. The test he finally chose, after two and a half years of trial and error, was to kill live cells by an automatic mechanism at a random time when no humans were in or near the office, and see if the plants reacted.

Using the brine shrimp that are sold as food for tropical fish, he rigged up a device which would automatically tip them from their bowl into a pot of boiling water. A mechanical programmer actuated the device at random so that it was impossible for Backster or his assistants to know when the event would occur. As a control, other dishes were programmed at other times to dump plain water containing no brine shrimp. Three plants would be attached to three separate galvanometers in three separate rooms. A fourth galvanometer was to be attached to a fixed value resistor to indicate possible variations caused by fluctuations in the power supply, or by electromagnetic disturbances occurring near or within the experiment's environment. Light temperature would be kept uniform on all plants which, as an extra precaution, would be brought from an outside source, passed through staging areas, and hardly be handled before the experiment.

Plants selected for the experiment were of the *Philodendron cordatum* species because of its large leaves, firm enough to withstand comfortably the pressure of electrodes. Different plants of the same species would be used on successive test runs. In scientific terms, Backster wished to prove that,

there exists an as yet undefined primary perception in plant life, that animal life termination can serve as a remotely located stimulus

to demonstrate this perception capability, and that this perception facility in plants can be shown to function independently of human involvement.

The results of these experiments showed that the plants did react strongly and synchronously to the death of the shrimp in boiling water; and the automated monitoring system, checked by visiting scientists, showed that plants reacted consistently to the death of the shrimp in a ratio that was five to one against the possibility of chance. The experiment and its results were written up in a scientific paper published in the winter of 1968 in Volume X of *The International Journal of Parapsychology* under the title 'Evidence of Primary Perception in Plant Life'.

More than seven thousand scientists asked for reprints of the report on Backster's original research. Students and scientists at some two dozen American universities indicated they intended to attempt to 'replicate' Backster's experiments as soon as they could obtain the necessary equipment.* Foundations expressed interest in providing funds for further experiments. The news media, which at first ignored Backster's paper, went into a flurry of excitement over the story when in February 1969 *National Wildlife* published a feature article which attracted such world-wide attention that secretaries and housewives began talking to their plants, and *dracaena Massangeana* became a household word.

Whereas the readers seemed to be most intrigued by the thought that an oak tree could actually quake at the approach of a woodchopper, or that a carrot could shiver at the sight of rabbits, the editors of *National Wildlife* were more concerned about the application of Backster's phenomenon to medical diagnosis, criminal investigation and espionage. Some aspects of this were so fantastic that they dared not as yet repeat them in print. *Medical World News* of 21 March 1969 commented that at last ESP research was 'on the verge of achieving the scientific respectability that investigators of psychic phenomena

* Backster has been loath to give out the names of these establishments so as not to have them importuned by outsiders until they have accomplished their tests and can make considered announcements of their results at a time of their own choosing.

have sought in vain since 1882 when the British Society for Psychical Research was founded in Cambridge'.

Now that funds were forthcoming, Backster was able to invest in more expensive equipment, including electrocardiographs and electro-encephalographs. These instruments, normally used for measuring electrical emissions from heart and brain, recorded the difference in the potential discharge of plants without putting current through them. The cardiograph gave readings more sensitive than the polygraph; the encephalograph gave readings ten times more sensitive than the cardiograph.

A fortuitous occurrence led Backster into another realm of research. One evening, as he was about to feed a raw egg to his dog, he noticed that as he cracked the egg, one of his plants attached to a polygraph reacted strenuously. The next evening he watched again as the same thing happened. Curious to see what the egg might be feeling, he attached it to a galvanometer, and was once more up to his ears in research.

For nine hours Backster got an active chart recording from the egg which corresponded to the rhythm of the heartbeats of the chicken embryo But the egg had been bought at the local delicatessen and was unfertilized. Later, breaking the egg and dissecting it, he was astonished to find that it contained no physical circulatory structure of any sort to account for the pulsation. He appeared to have tapped some sort of force field not conventionally understood within the present body of scientific knowledge.

He concluded by putting one egg on the cardiograph and, at the other end of the office, dumped another egg in scalding water. The first egg showed a sharp reaction to the death of its partner. Such was the importance of this discovery that Backster temporarily abandoned his experiments with plants. Indeed, it gave rise to profound implications about the origin of life and could form the subject of another whole book.

2

Mechanical uses of plants

The next man to probe the mysteries of plant communication was Pierre Paul Sauvin, an electronics specialist from West Patterson, New Jersey, who happened to hear Backster interviewed on a radio programme, hosted by Long John Nebel.

An assiduous investigator of ESP and of the phenomenon of remote hypnotism, Pierre Paul Sauvin was equally at home in the 'state of the art' and 'feasibility considerations' of the engineer, mostly because of his training and employment for several large corporations, including Aerospace and International Telephone and Telegraph

When Long John – a professional sceptic – roped Backster into a corner to get him to describe some practical uses for his discovery of primary perception in plants, Backster suggested that in jungle warfare soldiers in dangerous territory could wire up the local plants to act as 'stress alarm indicators' and avoid being ambushed 'But if you really want to make a psychologist sit up and take notice,' he said, 'you could instrument a plant to activate a small electric train, getting it to move back and forth on no other command than that of human emotion.' This notion, though singularly impractical, could be spelled out in Sauvin's electronics jargon as an 'anxiety response device', and it fired him to make experiments of his own.

Sauvin claims that many of his insights and ideas for inventions come to him in psychic flashes, as if he were merely acting as a medium. He says he sometimes gets the factual data necessary for an invention without fully understanding the principle, or how it relates to the whole, and must get further details by questions addressed to 'levels beyond'. Using high voltage generators Sauvin can put 27,000 volts through his

body and remotely activate a large bulb filled with helium to serve as an electronic ouija board, its dark rings flowing in one direction or the other in answer to his questions. He also developed a system guaranteed to hypnotize even the most recalcitrant person by means of an unstable platform in a pitch black room and the swaying of a rainbow pattern of light that causes the subject to lose his balance.

With such expertise it was not long before Sauvin had a toy electric train running round a track, reversing its direction in response to Sauvin's thought and emotion, relayed to a plant. Later he was able not only successfully to demonstrate the performance before an audience in Madison, New Jersey, but to make the train start and stop at will under the klieg lights of a television studio. As the engine moved around the track it would activate a switch leading to Sauvin's body in such a way as to give him a sharp electric shock. Just ahead on the track, another switch was wired to a galvanometer attached to an ordinary philodendron. As the philodendron picked up Sauvin's emotional reaction at being shocked, the galvanometer needle would jump and throw the switch, reversing the train. The next step was for Sauvin to simply remember the sensation of being shocked and project it in order for the plant to activate the switch.

Though Sauvin had long been interested in parapsychology and was fascinated with the psychological implications of a plant responding to human thought and emotion, his main preoccupation was the development of a foolproof plant device that could be activated by any human being. Whether plants were 'conscious' or not, Sauvin was convinced they had an energy field similar to the energy field generated by a human being, and that somehow an interaction of these fields could be put to use. The problem was to develop equipment sensitive enough to take advantage of the phenomenon in an absolutely reliable way. Perusing the endless stream of trade journals that passed across his desk as a technical writer for I.T.T., Sauvin was struck by a series of articles in *Popular Electronics*, on unusual electronic circuits and exotic weaponry, by a mysterious writer named L. George Lawrence. The author, intrigued by the Russian development of animal guidance systems for

training cats to pilot nonjammable air-to-air missiles right on to target, speculated in his articles on training plants to respond to the presence of selected objects and images, evidently for a similar purpose. After much work Sauvin eventually produced an instrument through which he hoped to be able to distinguish very fine changes in the field of plants. The sensitivity achieved was one hundred times greater than could be obtained with Backster's galvanometer, and enormous amounts of electronic 'noise' were eliminated.

What Sauvin was now measuring was no longer voltage amplitude but phase shift, or the fine lag between two running voltages. The result gave Sauvin an instrument roughly comparable to an ordinary light dimmer switch in which a plant leaf acted as the switch. Variations of apparent resistance in the leaf would cause a light to get brighter or dimmer depending on the response of the plant to outside effects

As soon as his device was functioning, Sauvin set about monitoring plants around the clock To catch the tiniest nuances of phase shift Sauvin hooked his plants to an oscilloscope, a big electronic green eye with a figure eight of light whose loops changed shape as the current from a plant varied, making patterns much like the fluttering of the wings of a butterfly

Simultaneously, a varying tone was produced by current run through an amplified tone oscillator which enabled Sauvin to hear minute changes in vibrations, and know how his plants were reacting. A bank of tape recorders kept a permanent record of this oscillating tone, along with a monotonous beep every second from an international time signal broadcast. With a stop-watch he could check the effect he was having on his plants from a distance, wherever he happened to be.

Some of Sauvin's strange electronic equipment now came into its own, especially a complex system of automatic phone-answering and recording devices. For some years he had been writing for various specialized magazines, under various pseudonyms, while retaining his regular job. He had devised an ingenious system whereby when he was at work he was yet able to consult with his editors and answer their queries. By means of a small radio transmitter strapped to his leg and a

random stimulus would affect all three plants at once, and thus it was a step forward.

Sauvin was now anxious to release his data confirming Backster's findings and to make public his own contribution to a science which he felt had a potential for the world no less great than Marconi's use of radio waves. Unable to interest the mass media, or such conservative journals as *Science* or *Scientific American*, he decided to angle his material to the engineering and mechanical journals to which he was already a regular contributor. To incite the interest of the editor of a car magazine he concocted a story about a device that would enable him to start his car by remote control by means of thought waves to a plant. With the help of a small radio transmitter this proved to be a simple enough operation, the only technical difficulty being the designing of a gadget that would give just the right pressure to the ignition key, repeat the pressure if the engine failed to catch, and release pressure the moment it did. The device was designed to appeal to a citizen with the prospect of being able to wake up on a frosty morning and get his car and heater started while still comfortably enjoying his breakfast. But for Sauvin there was one defect; a plant was not really needed. The device could be operated directly by radio.

To include his beloved plants in a worthwhile gadget, attractive to car and home owners, Sauvin worked out a system whereby a man returning on a snowy night could approach his garage and signal his pet philodendron to open the doors. Here the plant's function of responding only to its master would make it admirably burglar-proof.

To arouse the interest of serious scientists and to attract the necessary funds for a proper laboratory, Sauvin hit upon the idea of showing that an aeroplane could be flown by thought control with the aid of his plants attached to his sensitive devices. For years Sauvin, already a licensed pilot, had enjoyed the hobby of flying model planes, some with a wing-spread as large as six feet, controlling them entirely from the ground by radio signals, getting them to bank, loop, speed up, slow down and even land. By a slight adaptation to his transmitter equipment, Sauvin was able to start, stop or affect the speed of

a model plane in flight by transmitting a thought to a plant.

In the sensitivity of plants Sauvin also saw a means of detecting a potential hijacker at an airport before he could board a plane. He suggested 'Operation Skyjack', a system whereby plants could be used in conjunction with galvanometers, gyrating magnets and other sensitive devices to pick up the turbulent emotions of a hijacker while he was being screened by security officials.

Already the U.S. Army has taken an interest in devising ways of measuring the emotional responses of people via plants, without having to sensitize the plants to a special person beforehand. And at Fort Belvoir, Virginia, funds have been provided for research on plant experimentation The U.S. Navy is also showing interest. Eldon Byrd, an operations analyst with the Advanced Planning and Analysis Staff of the Naval Ordnance Laboratory in Silver Spring, Maryland, has been repeating Backster's experiments with some success. Like Backster, Byrd found that by merely thinking of harming a plant's leaf, it was possible to make the polygraph needle jump. His experiments involved monitoring a plant's reaction to stimuli from water, infra-red and ultra-violet light, fire, physical stress, and dismemberment.

Byrd believes the galvanometrical effect produced by a plant is not caused by electrical resistance in the leaf, but by a change of biopotential in the cells from outside to the inside membrane, as defined by the Swedish Dr L. Karlson who has shown that a cluster of cells can change polarity, though the energy which causes cells to become polarized is not known. Byrd believes that a voltage change in the cells is what is being measured, and that it is the mechanism of consciousness which causes the change in potential.

Byrd's research supports Backster's observations that plants exhibit a quality of awareness and an empathy to other organisms that are stimulated in their presence. Like Backster, he also found that plants tended to 'faint' under excess stress, suddenly ceasing to respond even to the most basic stimuli, such as light and heat. Like Backster and Sauvin, Byrd was able to demonstrate on television a plant's reaction to various stimuli, including his *intent* to burn it. On camera Byrd showed

that a plant would respond to his shaking a spider in a pill box with only about a second's delay, and that the response continued for as long as a minute. There was also a strong reaction when he cut the leaf from another plant.

A revolutionary new lie-detector device known as a Psychological Stress Evaluator, has now been made available to Byrd. The theory behind it is that the human voice normally operates in both audible frequencies and inaudible frequency modulations. The inaudible vibrations disappear from the voice when a person is under stress; and although the ear does not note the difference, the machine, according to the inventor, can trace the fluctuations on a chart Byrd is working on a means of adapting this device to use in conjunction with plants.

In Japan a soft-spoken doctor of philosophy and successful electronics engineer from Kamakura, a charmingly gardened retreat not far from Yokohama harbour, has developed a similar lie detector into a device with the most fabulous results yet achieved in the plant kingdom. A regular consultant on lie detection for the Japanese police, Dr Ken Hashimoto read about Backster's laboratory experiments and decided to wire one of the family cacti to an ordinary polygraph by means of acupuncture needles.

His intent was more revolutionary than Backster's, Sauvin's or Byrd's. He hoped to enter into actual conversation with a plant; to do so he counted on an improvement he had made in the Japanese procedure for lie detection. To simplify and make less expensive the process of police interrogation, Dr Hashimoto developed a system, similar to Dektor's, whereby nothing more than a cassette tape is needed to record the reactions of a suspect. Electronically transposing the modulations of the suspect's voice, Hashimoto was able to produce on paper a running graph reliable enough to pass muster in a Japanese law court.

It now dawned on Hashimoto that by reversing the system he might be able to transform the tracings from a graph into modulated sounds, giving voice to a plant. His first experiments with a cactus similar to the giant saguaro of California and the Arizona desert, but much smaller, were a failure. Loath to conclude that either Backster's reports or his own equipment

was defective, Hashimoto decided that it might be he who was having trouble communicating with the plant, despite the fact that he is one of Japan's leading researchers into psychic phenomena.

His wife, on the other hand, who loves plants and is renowned for her 'green thumb', soon got sensational results. As Mrs Hashimoto assured the plant that she loved it, there was an instant response from the cactus. Transformed and amplified by Dr Hashimoto's electronic equipment, the sound produced by the plant was like the high-pitched hum of very-high-voltage wires heard from a distance, except that it was more like a song, the rhythm and tone being varied and pleasant, at times even warm and almost jolly.

John Francis Dougherty, a young American from Marina Del Rey, California, who witnessed one of these conversations, says it sounded as if Mrs Hashimoto, speaking in modulated Japanese, was being answered by the plant in modulated 'cactese'. Dougherty further reports that the Hashimotos became so intimate with their plant that they were soon able to teach it to count and add up to twenty In answer to a query as to how much two and two make, the plant would respond with sounds which, when transcribed back into inked tracings, produced four distinct and conjoined peaks.

Dr Hashimoto, who got his doctorate from Tokyo University, and is chief of the Hashimoto Electronics Research Centre, as well as managing director and chief of research for the Fuji Electronic Industries – which produce the huge animated electrical signs that illumine Tokyo – has since demonstrated the adding capacities of his cactus to audiences all over Japan.

Asked to explain the phenomenon of his talking and adding cactus, Dr Hashimoto, who is also, surprisingly, one of Japan's best-selling authors – his *Introduction to ESP* is in its sixtieth printing and his *Mystery of the Fourth Dimensional World* is in its eightieth – answered that there are many phenomena that cannot be explained by the theories of present-day physics. He believes there is a world beyond the present three-dimensional world defined by physics, that this three-dimensional world is merely a shadow of a fourth dimensional, nonmaterial world

He further believes that this fourth-dimensional world controls the three-dimensional material world through what he calls 'mind concentration' or what others call psychokinesis, or mind-over-matter.

3

Plants can read your mind

While Backster and Sauvin were developing their experiments in the eastern part of the United States, in Los Gatos, California, a research chemist named Marcel Vogel began to probe into the realm of creativity. He had been challenged to give a course on the subject for the engineers and scientists of International Business Machines, the firm with which he worked. It was only after he had taken on the job that he realized the enormity of it. 'How does one define creativity?' he found himself asking. 'What is a creative person?' To answer these questions, Vogel, who had studied for years to become a Franciscan priest, began writing an outline for twelve two-hour seminars which he hoped would represent an ultimate challenge to his students.

As a boy, Vogel's curiosity about creativity had first been stirred when he wondered what caused the light in fire-flies and glow-worms. Finding nothing on luminescence in the great libraries he informed his mother that he would write a book on the subject. Ten years later his *Luminescence in Liquids and Solids and their Practical Application* was published in collaboration with Chicago University's Dr Peter Pringsheim. Two years after that, Vogel formed his own company called *Vogel Luminescence* in San Francisco and it soon became a leader in the field. Over a period of fifteen years Vogel's firm developed a variety of new products; the red colour seen on television screens, fluorescent crayons, tags for insecticides, a 'black light' inspection kit to determine, from their urine, the secret trackways of rodents in cellars, sewers and slums, and the psychedelic colours popular in new age posters.

By the mid 1950s, Vogel was bored with his day to day tasks of administering a company, and sold it to go to work for

delving into magnetics, optic-electrical devices, and liquid crystal systems, developing and patenting inventions of crucial significance to the storage of information in computers, and winning the awards which adorn the walls of his San Jose home.

During the Creativity course which Vogel was asked to give at I.B.M. one of his students gave him an *Argosy* magazine with an article on Backster's work entitled 'Do Plants Have Emotions?' Vogel's first reaction was to throw the article into the waste-paper basket, convinced that Backster was just another charlatan unworthy of serious consideration. Yet something about the idea gnawed at his mind. A few days later, he retrieved the article and completely reversed his opinion.

The article, read aloud to his seminar students, aroused both derision and curiosity; but all agreed that it would be interesting to experiment with plants. That same evening, one of the students called Vogel's attention to the latest issue of *Popular Electronics* which referred to Backster's work, and included a wiring diagram for an instrument called a 'psychanalyser' which would pick up and amplify reactions from plants and could be built for less than twenty-five dollars.

Vogel divided his class into three groups and challenged them to repeat some of Backster's experiments. By the end of the seminar, not one of the three teams had achieved any success. Vogel, on the other hand, was able to report that he had replicated certain of Backster's results, and proceeded to demonstrate how plants anticipate the act of having their leaves torn and react with even greater alarm to the threat of being burnt, or uprooted – more so even than if they are actually torn, burnt or otherwise roughly treated. Naturally he wondered why he alone seemed to be successful.

Between the ages of eleven and fourteen, Vogel had read everything he could get his hands on which might explain the workings of the human mind. Dipping into books on magic, spiritualism and hypnotic techniques, he was soon giving stage demonstrations as a teenage hypnotist. With fascination he went on to study Mesmer's theory of a universal

disease, Coué's ideas of auto-suggestion as they related to painless child-birth and self-betterment, and the postulates of various writers on 'psychic energy'. This was a term popularized by Carl Jung who, though he differentiated it from physical energy, believed it to be incommensurable. Now Vogel reasoned that if there was a 'psychic energy' then, like other forms of energy, it must be storable. But in what? Staring at the many chemicals on the shelves of his I.B.M. laboratory, he wondered which of them could be used to store this energy.

In his dilemma, he consulted a spiritually gifted friend, Vivian Wiley, to see if she could help. When she came to his laboratory and went through the chemicals laid out for her, she said that, in her judgement, none offered any promise of a solution for Vogel's problem.

Vogel suggested she ignore his preconceived ideas about chemicals and use anything which might intuitively occur to her. Back in her garden, Vivian Wiley picked two leaves from a saxifrage, one of which she placed on her bedside table, the other in the living-room. 'Each day when I get up,' she told Vogel, 'I will look at the leaf by my bed and *will* that it continue to live; but I will pay no attention to the other. We will see what happens.'

A month later, she asked Vogel to come to her house and bring a camera to photograph the leaves. He could hardly believe what he saw. The leaf to which his friend had paid no attention was flaccid, turning brown and beginning to decay. The leaf on which she had focused daily attention was radiantly vital and green, just as if it had been freshly picked from the garden. Some power appeared to be defying natural law, keeping the leaf in a healthy state. Curious to see if he could get the same results as his friend, Vogel picked three leaves from an elm outside his I.B.M. laboratory, took them home and laid them on a plate of glass near his bed. Each day, before breakfast, Vogel stared concentratedly at the two outer leaves on the glass for about one minute, exhorting them lovingly to continue to live; the centre leaf he assiduously ignored. After a week, the centre leaf had turned brown and shrivelled, whereas the outer leaves were still green and

severed stems of the live leaves appeared to have healed the wounds caused by ripping from the tree.

Vogel was convinced that he was witnessing the power of 'psychic energy' in action. If the power of the mind could keep a leaf green, Vogel wondered what its effect might be on liquid crystals, an intensive study of which he was pursuing for I.B.M. Trained in microscopy, Vogel had taken hundreds of colour slides of liquid crystal behaviour magnified up to three hundred times. While making the slides, he realized that, by 'relaxing his mind', he could sense activity not visually revealed in the microscopic field

> I began to pick up things at the microscope which eluded others, not with ocular vision but with 'my mind's eye'. After becoming aware of them, I was led by some form of higher sensory awareness to adjust the lighting conditions to allow these phenomena to be optically recordable to the human eye or to a camera.

He reached the conclusion that crystals are brought into a solid, or physical, state of existence by *preforms*, or ghost-images of pure energy which *anticipate* the solids. Since plants could pick up a human intention to burn them, for example, there was no doubt in his mind that intent was one kind of energy field

By the autumn of 1971, Vogel's microscopic work was taking up most of his time, and he was forced to abandon his research on plants. He was only stimulated to continue later when an article on such work appeared in the *San Jose Mercury*, as a result of which he was besieged on the telephone for information.

Vogel realized that, before he could observe with precision the effects on plants of human thoughts and emotion, he would have to improve his technique of affixing electrodes to the plant leaves in such a way as to eliminate what he considered to be the major source of spurious data – or engineer's 'noise' – which caused the pen-recorder to drift on the chart. Backster's system of clamping the electrodes to the leaves seemed to Vogel to cause the plant to respond to random electro-magnetic frequencies, such as 60-cycle hum, or any electro-

around it, which in turn caused the pen-recorder to wander.

Vogel also found that some of the philodendrons he worked with responded faster, others more slowly, some very distinctly, others less distinctly, and that not only plants, but also their individual leaves, had their own unique personalities. Leaves with a large electrical resistance were especially difficult to work with; fleshy leaves with a high water content were the best. Plants appeared to go through phases of activity and inactivity, full of response at certain times of the day or days of the month, 'sluggish' or 'morose' at other times.

To make sure that none of these recording effects was the result of faulty electroding, Vogel developed a mucilaginous substance composed of a solution of agar, with a thickener of karri gum and salt. This paste was brushed on to the leaves before gently applying *carefully polished* 1 × 1–1/2 in. stainless-steel electrodes. When the agar jelly hardened around the edges of the electronic pick-ups, it sealed their faces into a moist interior, virtually eliminating all the variability in signal output caused by pressure on leaves when clamped between ordinary electrodes. This system produced for Vogel a base line on the chart that was perfectly straight, without oscillations

Having eliminated these random influences, Vogel began a new round of experiments in the spring of 1971 to see if he could establish the exact moment when a philodendron entered into recordable communication with a human being. With a philodendron attached to a galvanometer which produced a straight base line, Vogel stood before the plant, completely relaxed, breathing deeply and almost touching it with outspread fingers. At the same time, he began to shower the plant with the same kind of affectionate emotion as would flow to a friend Each time he did this, a series of ascending oscillations was described on the chart by the pen holder. At the same time Vogel could tangibly feel, on the palms of his hands, an outpouring from the plant of some sort of energy. After three to five minutes, further release of emotion on Vogel's part evoked no further action from the plant, which seemed to have discharged all its energy in response to his

and the philodendron appeared to be of the same order as that evoked when lovers or close friends meet, the intensity of mutual response evoking a surge of energy until it is finally expended and must be recharged. Like lovers, both Vogel and the plant appeared to remain suffused with joy and contentment.

In a botanical nursery, Vogel found that he could easily pick out a particularly sensitive plant by running his hands over a group until he felt a slight cooling sensation followed by what he describes as a series of electrical pulses, indicating a powerful field. If he increased the distance between himself and such a plant, he found, as Backster had, that he could get a similar reaction from it, first from outside the house, from down the block, and even from his laboratory in Los Gatos, eight miles away.

In another experiment, Vogel wired two plants to the same recording machine and snipped a leaf from the first plant. The second plant responded to the hurt being inflicted on its neighbour, but *only when Vogel was paying attention to it.* If he cut off a leaf while ignoring the second plant, the response was lacking

From his own experience, Vogel knew that masters of the art of Yoga, and teachers of other forms of deep meditation such as Zen, are unaware of disturbing influences around them when in meditative states. An electro-encephalograph picks up from them quite a different set of brain waves from those when the same persons are alert to the everyday world around them. Thus it became clearer to him that a certain focused state of consciousness on his part seemed to become an integral and balancing part of the circuitry required to monitor his plants. A plant could be awakened from somnolence to sensitivity by his giving up his normally conscious state and focusing a seemingly extraconscious part of his mind on the exact notion that the plant be happy and feel loved, that it be blessed with healthy growth. In this way, man and plant seemed to interact, and, as a unit, pick up sensations from events, or third parties, which became recordable through the plant The process of sensitizing both himself and the plant, Vogel found, would sometimes take only a few minutes, at other times nearly half an hour.

Asked to describe the process in detail, Vogel said that, first he quietens the sensory responses of his body organs, then he becomes aware of an energetic relationship between the plant and himself. When a state of balance between the bio-electrical potential of both the plant and himself was achieved, the plant was no longer sensitive to noise, temperature, the normal electrical fields surrounding it, nor to other plants. It responded only to Vogel, who had effectively tuned himself to it – or perhaps, simply hypnotized it.

Vogel now felt confident enough to accept invitations to lecture and to give demonstrations on television. At one lecture he said unequivocally:

'It is fact. man can and does communicate with plant life. Plants are living objects, sensitive, rooted in space. They may be blind, deaf and dumb in the human sense, but there is no doubt in my mind that they are extremely sensitive instruments for measuring man's emotions. They radiate energy, forces that are beneficial to man. One can feel these forces! They feed into one's own force-field which in turn feeds back energy to the plant.'

The American Indians, said Vogel, were keenly aware of these faculties. When in need, they would go into the woods With their arms.extended, they would place their backs to a pine tree in order to replenish themselves with its power.

Sometimes he encountered sceptics or hostile observers in his audience. By paying attention to the emanation of negative attitudes, Vogel found he could isolate the individuals emitting them and counter their effect with a deep breath, learned in Yoga instruction. He would then switch his mind to another mental image just as if he were turning a dial to a different setting.

Vogel reiterates that,

'The feeling of hostility, of negativity, in an audience, is well known to all public lecturers and is one of the main barriers to effective communication. To counteract this force is one of the most difficult tasks in public demonstration of these plant experiments. If one cannot do this, the plant and therefore the equipment will "go dead" and there is no response until a positive tie can be re-established.'

Vogel has also said:

'It seems that I act as a filtering system which limits the response of a plant to the outside environment. I can turn it off or on, so that people and plant become mutually responsive. By charging the plant with some energy within me, I can cause the plant to build up a sensitivity for this kind of work.

'It is extremely important that one understand that the plant's response is, to my mind, not that of an intelligence in plant form, but that the plant becomes an extension of oneself. One can then interact with the bio-electric field of the plant, or through it, with the thought processes and emotions in a third person.'

Vogel concluded that,

'a Life Force, or Cosmic Energy, surrounding all living things is shareable among plants, animals and humans. Through such sharing, a person and a plant become one! This oneness makes possible a mutual sensitivity allowing plant and man not only to intercommunicate, but to record these communications via the plant on a recording chart.'

Because his observations indicated there was an interchange, even a fusion of energies between plant and man, Vogel wondered whether an exceptionally sensitive individual could actually get *into* a plant, as was reported of the sixteenth-century German mystic Jacob Boehme, who, as a young man, became illumined and described being able to see in another dimension. Boehme said he could look at a growing plant and suddenly, by willing to do so, mingle with that plant, be part of the plant, feel its life 'struggling towards the light'. He said he was able to share the simple ambitions of the plant and 'rejoice with a joyously growing leaf'.

One day Vogel was visited in San Jose by Debbie Sapp, a quiet self-effacing girl who impressed Vogel with her initial ability to enter into instant rapport with his philodendron, as established by his instrumentation.

When the plant was entirely calm, he asked her, point blank: 'Can you now get into that plant?' Debbie nodded assent, and her face took on an attitude of quiet repose, of detachment, as if she were far away in another universe. Immediately the recording pen began to trace a pattern of undulations revealing to Vogel that the plant was receiving an unusual amount of energy.

Debbie later described what happened in writing:

Mr Vogel asked me to relax and project myself into the philodendron. Several things took place as I began to carry out his request.

First, I wondered exactly how I would get inside a plant. I made a conscious decision to let my imagination take over and found myself entering the main stem through a doorway at its base. Once inside, I saw the moving cells and water travelling upward through the stem, and let myself move with this upward flow.

Approaching the spreading leaves in my imagination, I could feel myself being drawn from an imaginary world into a realm over which I had no control. There were no mental pictures, but rather a feeling that I was becoming part of, and filling out, a broad expansive surface. This seemed to me to be describable only as pure consciousness.

I felt acceptance and positive protection by the plant. There was no sense of time, just a feeling of unity in existence and in space. I smiled spontaneously and let myself be one with the plant.

Then Mr Vogel asked me to relax. When he said this, I realized I was very tired but peaceful. All of my energy had been with the plant.

Vogel, who was observing the recording on the chart, noticed an abrupt stop when the girl 'came out' of the plant. On later occasions, when she 're-entered' it, she was able to describe the inner make-up of its cells and their structure in detail. She specifically noted that one of the leaves had been badly burned by an electrode. When Vogel detached the electrode, he found a hole almost all the way through the leaf.

Vogel has since tried the same experiment with dozens of other people, asking them to go into a single leaf and look at the individual cells within it. All gave consistent descriptions of various parts of the cellular body down to the detailed organization of the DNA molecules.

From the experiment, Vogel came to the conclusion that, 'We can move into individual cells in our own bodies and, depending on our state of mind, affect them in various ways. One day, this may explain the cause of disease.'

Knowing that children are more 'open-minded' than adults, Vogel has begun to teach children how to interact with plants.

First, he asks them to feel a leaf, describe its temperature, consistency and texture in detail. Next, he lets them bend leaves and become aware of their resiliency before going on to gently stroke their upper and under sides. If his pupils take pleasure in describing to him the sensations they feel, Vogel asks them to take their hands away from the leaves and try to feel a force or energy emanating from them. Many of the children instantly described a rippling or tingling sensation.

Vogel noticed that those children who felt the strongest sensations were wholly engrossed in what they were doing. Once they felt the tingling, he would say: 'Now completely relax and feel the give and take of the energy. When you feel it pulsing, gently move your hand up and down over the leaf.' Following his directions, the young experimenters could easily see that, when they brought their hands down, the leaves fell away. By continued repetition of this motion, the leaves would begin to oscillate. With the use of both hands they could actually get a plant to sway. As they gained confidence, Vogel urged them to move further and further away from the plant.

'This is basic training,' comments Vogel, 'to develop an expanded awareness of a force which is not visible. The awareness established, they see they can operate with this force!'

Adults, according to Vogel, are much less successful than children and this leads him to think that many scientists are not going to be able to repeat his or Backster's experiments in laboratories. 'If they approach the experimentation in a mechanistic way and don't enter into mutual communication with their plants and treat them as friends, they will fail!'

Indeed, Vogel has been told by one doctor working at the California Psychical Society that he has had not a single result, though he had worked for months. The same is true for one of Denver's most renowned psychoanalysts. Vogel comments that,

> Hundreds of laboratory workers around the world are going to be just as frustrated and disappointed as these men until they appreciate that the empathy between plant and human is the *key*, and learn how to establish it. No amount of checking in laboratories

is going to prove a thing until the experiments are done by properly trained observers. Spiritual development is indispensable. But this runs counter to the philosophy of many scientists who do not realize that creative experimentation means that the *experimenters must become part of their experiments.*

This highlights the difference in approach between Vogel and Backster, indicating, perhaps, that Vogel is establishing a type of hypnotic control over his plants. Sceptics are achieving a reverse effect, yet Backster's plants, left strictly alone, will react to their environment quite normally.

Vogel says that even when a person *can* affect a plant, the result is not always a happy one. He asked one of his friends, a clinical psychologist, who had come to see for himself if there was any truth in the plant research, to project a strong emotion to a philodendron fifteen feet away. The plant surged into an instantaneous and intense reaction and then, suddenly, 'went dead'. When Vogel asked the psychologist what had gone through his mind, the man answered that he had mentally compared Vogel's plant with his own philodendron at home, and thought how inferior Vogel's was to his. The 'feelings' of Vogel's plant were evidently so badly hurt that it refused to respond for the rest of the day; in fact, it sulked for two weeks thereafter.

Vogel could not doubt that plants have a definite aversion to certain humans, or, more exactly, to what those humans are thinking. This being true, Vogel considers that it might be possible, one day, to read a person's thoughts through a plant. Something of the sort has already taken place. At Vogel's request, a friend who was a nuclear physicist began to work on a technical problem. As he was cogitating, Vogel's plant registered a series of tracings on the recorder for 118 seconds. When the tracing fell back to base line, Vogel informed his friend that he had stopped his train of thought. The friend corroborated. Had Vogel actually captured a thought process on a chart via a plant? When after a few minutes, the physicist at Vogel's request began to think of his wife the plant again recorded a tracing, this time for 105 seconds. It seemed to Vogel that, right in front of him in his living-room, a plant was picking up and passing on a man's

mental impressions of his wife. If one could interpret such tracings, could one not know what the man was thinking?

After a break for a cup of coffee, Vogel almost casually asked his friend to think once more of his wife in the same way he had thought of her before. The plant registered another 105-second-long tracing very similar to the first. To Vogel this was the first time a plant seemed to have recorded a similar thought spectrogram and duplicated it! Perhaps, he thought, it is only a matter of time before chart patterns can be decoded into the message units which will be able to describe thought processes.

Having established that plants respond to individual humans and to other plants, Vogel next experimented with people in groups. While he was entertaining a group of sceptical psychologists, medical doctors and computer programmers at his house, he let them look over his equipment for hidden devices and gimmicks which they insisted must exist. Then he asked them to sit in a circle and talk in order to see what reactions the plant might pick up. For an hour, the group conversed with hardly a response from the plant. Just as they had all concluded that the whole thing was a fake, one of them said: 'How about sex?' To their surprise, the plant came to life, the pen-recorder oscillating wildly on the chart. This led to speculation that talking of sex could stir up in the atmosphere some sort of sexual energy such as the 'orgone' discovered and described by Dr Wilhelm Reich, and that the ancient fertility rites in which humans had sexual intercourse in freshly seeded fields might indeed have stimulated plants to grow.

On another occasion, the plant responded to an audience's reaction to a spooky story told in a darkened room lit only by a red-shaded candle. At certain points in the story, such as: 'The door of the mysterious cabin in the forest began slowly to open . . .', or, 'Suddenly, there appeared round the corner a strange man with a knife in his hand . . .', or 'Charles bent down and raised the lid of the coffin', the plant seemed to pay closer attention. To Vogel, this was evidence that a plant can measure 'figments of the imagination', as being converted to energy by the group as a whole.

Vogel stresses that experiments with plants can be extremely

dangerous to those who do not have the ability properly to alter their states of consciousness. 'Focused thought,' he says, 'can exert a tremendous effect on the body of a person in a higher mental state, if he lets his emotions interfere.'

'No one,' says Vogel, 'who is not in sound bodily health should become involved with plants or any other kind of psychic research.' Though he has not been able to prove it, Vogel feels that a special diet of vegetables, fruits and nuts, rich in minerals and proteins, allows the body to build the kind of energy necessary for such work. 'One draws energy at high levels,' he says, 'and this requires good nutrition.'

Asked how the higher energies, such as thought, might operate on the physical bodies of living organisms, Vogel says he has now begun to speculate on the strange properties of water. As a crystallographer, he is interested in the fact that, unlike most salts, which have one crystalline form, core samples of glacier ice have more than thirty different forms. 'Uninitiated persons, when first looking at them,' says Vogel, 'could conclude that they were observing as many different substances. And they would be right in their own way because water is a real mystery.'

Vogel makes the prediction, which he stresses is as yet far from established fact, that since living things all have a high water content, the vitality of a person must be in some way related to the rate of respiration. As water moves around the body and through its pores, charges are built. Vogel's first clue about his postulate on water came from the fact that some 'psychics' have lost several pounds of body weight during sessions in which they expended vital, or psychic, energy. 'If we could weigh a person doing psychic research on a sensitive scale,' suggests Vogel, 'we would find that there is a loss of weight in each case. It is a water loss, as it is in persons who go on crash diets.'

Whatever the future brings, Vogel believes that his research with plants can help man to the recognition of long-ignored truths. By developing simple training kits, which he is presently designing, he thinks he can teach children to release their emotions and watch the effects in a measurable way.

'They can thus learn the art of *loving*,' says Vogel, 'and know

truly that when they think a thought they release a tremendous power or force in space. By knowing that they *are* their thoughts, they will know how to use thinking to achieve spiritual, emotional, and intellectual growth.

'This is no machine to measure brain waves or any gimmick to help people to become seers or mystics,' Vogel insists, 'but one to help children to become *simple, honest human beings*.'

Asked to sum up the importance of his research with plants, Vogel replied:

> 'So much of the ills and suffering in life comes from our inability to release stresses and forces within us. When a person rejects us, we rebel inside and we *hold on to this rejection*. This builds a stress which, as Dr Wilhelm Reich showed so long ago, becomes locked in as muscular tension, and if not unlocked, depletes the body's energy field and alters its chemistry. My research with plants indicates one pathway to deliverance.'

For Marcel Vogel, plants have opened new horizons. The vegetal kingdom seems capable of picking up messages of intent, benign or malicious, that are inherently more truthful than when translated into words – a talent which all human beings may share but which they have momentarily occluded.

Two young Californian students of humanistic psychology and Hindu philosophy, Randall Fontes and Robert Swanson, have now pursued Vogel's quarry into unbeaten ground. Using sophisticated equipment lent them by the IBM researcher, they have made a series of discoveries so surprising that despite their youth they have been granted funds and equipment by established universities to further probe the mysteries of plant communication.

Fontes' and Swanson's first discovery came virtually by accident when one noticed that the other's yawning was being picked up by a plant in the form of energy surges. Instead of ignoring the phenomenon as improbable, the two students followed up the clue remembering that in ancient Hindu texts an exaggerated yawn was considered a means by which a tired person could be recharged with vivifying *shakhti*, a postulated energy filling the universe.

With the help of Dr Norman Goldstein, a professor of biology at State University in Hayward, California, Fontes went on to discover an electrical potential travelling from cell to cell in the ivy philodendron which gives a strong indication of the presence of a hitherto unsuspected simple nervous system. He has most recently been working with *Nitella*, an aquatic plant whose individual cells can measure two inches or more At the Stanford Research Institute in California Fontes is cooperating with Dr Hal Puthoff, a physicist, and Pat Price, a former test pilot and chief-of-police, who has remarkable psychic powers. Price can get the *Nitella* to respond to his various mental projections almost unfailingly. This being so, Puthoff and Fontes are hopeful that by removing Price a considerable distance from the *Nitella* – say more than 1,000 miles – and by using sophisticated timing equipment, they will be able to establish whether Price can affect the plant at such a distance and whether the energy from his 'mental projection' moves faster than the speed of light. Meanwhile, Swanson is cooperating in the setting up of a parapsychologically oriented counselling centre at the John F Kennedy University in Martinez, California, where one of Swanson's goals is to determine just which people affect plants telepathically and which do not

4

Visitors from outer space

One day late in October 1971, a blue Volkswagen carrying some unusual scientific equipment drove into Oak Grove Park near Temecula, a tiny southern California village not far from the famous Mount Palomar Observatory. Out of the driver's seat stepped L. George Lawrence, a forty-seven-year-old Silesian-born electronics engineer. Lawrence and a field assistant had come to this remote desert-like spot to record signals from wild-growing oak trees, cacti, and yuccas. He had chosen the park because, in his words, it is 'an electromagnetic "deep-fringe" area, with no man-made interferences and thus ideal for getting clean, uncontaminated plant reactions'. His apparatus, very different from that of Backster, Sauvin, and Vogel, incorporated, in a temperature-controlled bath, living vegetal tissue shielded behind a Faraday tube that screened out even the slightest electromagnetic interference. Lawrence had found that living vegetable tissue was able to perceive signals far more delicately than electronic sensors and it was his belief that *biological* radiations transmitted by living things were best received by a *biological* medium. Electrodes were not attached to Lawrence's desert plants because the plants were far enough away from their neighbours to rule out signal interference. Instead, he trained a lensless tube with a wide aperture at a target plant. At greater distances he substituted a telescope for the lensless tube, and made the plant more visible by hanging a white cloth on it. The living tissue was able to pick up a directional signal from as far away as a mile. Perturbations of the living tissue were detected, not visually through a pen-recorder, but aurally by means of a continuous, low even whistle, which changed into a series of distinct pulses whenever it was disturbed by signals from a plant.

On their first day at Oak Grove Park Lawrence and his

assistant took a break for a late afternoon snack, seating themselves about ten yards from their instrument which was left pointing randomly at the sky. As Lawrence bit into a 'Hebrew National' knockwurst, the steady whistling sound from his equipment was interrupted by a series of distinct pulsations. Lawrence, who had not yet digested the knockwurst, but had well digested the Backster effect, thought the signals might have been caused by his killing some of the cells in the sausage. Second thoughts reminded him that pickled sausage meat is biologically dead. As he checked his instrumentation, to his amazement the audio signal continued to produce a distinct chain of pulses for over half an hour before the even whistle returned, indicating that nothing more was being received. The signals must have been coming from somewhere, and since his device had been continuously pointed upward towards the heavens, Lawrence was faced with the fantastic thought that *something or someone was transmitting from outer space*. The possibility of life beyond earth was both disturbing and exciting to him and his colleague, but they were loath to jump to a premature conclusion that they had picked up an intelligent signal from trillions of miles away through a plant tissue. Lawrence therefore determined to spend several months improving his equipment, making it into what he termed a 'biodynamic field station designed for interstellar signal reception'. This he did, and by April 1972, his equipment was sufficiently refined for him to attempt to point it once more in the same direction which had brought the reaction on the earlier occasion. The alignment then had been celestial coordinates near *Ursa Major*, the Great Bear. This time he drove out to the Pisgah Crater, a volcanic butte, 2,300 feet above sea level, in the middle of the arid Mojave Desert, and surrounded by some thirty square miles of flat lava beds with not so much as a blade of grass. Aligning his telescope – coupled with the Faraday tube, a camera, an electromagnetic interference monitor and the tissue chamber – in the general direction of *Ursa Major*, Lawrence switched on his audio signal. After a ninety-minute interval, his equipment again picked up a recognizable, though briefer, pattern of signals. According to Lawrence, the periods between rapid series of pulse trains

ranged from approximately three to ten minutes over a stretch of several hours as he monitored a single spot in the heavens.

It was a repetition of his 1971 observations and Lawrence began to wonder whether he had not accidentally stumbled over a scientific discovery of major proportions. He had no idea from where the signals might be coming or what or who was sending them, but it seemed to him highly possible that galactic drift played some role in their origin. 'The signals might be spilling over from the galactic equator which has a dense star population,' said Lawrence. 'We could be getting something from that area rather than from *Ursa Major*.'

He decided to continue the tests from his laboratory, pointing his machine at the same coordinates, leaving it on round the clock. Lawrence says that he had to wait weeks and sometimes months for the signals to come through, but when they did they were unmistakable. One signal produced a Brr-r-r-r-r beep-beep-beep type of audio pulse which Lawrence maintains no earthly entity has achieved.

Pressed to speculate on the nature of the strange signals, Lawrence stated:

'I don't believe they are directed at earthlings. I think we are dealing with transmissions between peer groups, and because we don't know anything about *biological communications* we are simply excluded from these "conversations". I also believe that the energy transmitted must be fantastically high since, at this basic level of its development, our instrumentation is not at all sophisticated and it would take a tremendous amount of power to create any response in it from such astronomical distances. The signals therefore, may be of an emergency nature. Something may be happening up there and someone may be desperately calling for help.'

Deciding that his findings may be of crucial significance and could herald a new and as yet unimagined system of communication, Lawrence sent a copy of his October 1971 tape, together with a seven-page report, to the Smithsonian Institution in Washington, D.C. where it is preserved as a potentially historical scientific document. The report concludes:

An apparent train of interstellar communication signals of unknown origin and destination has been observed. Since interception

was made by biological sensors, a biological-type signal transmission must be assumed. Test experiments were conducted in an electromagnetic deep-fringe area, the equipment itself being impervious to electromagnetic radiation. Follow-up tests revealed no equipment defects. Because interstellar listening experiments are not conducted on a routine basis, the suggestion is advanced that verification tests should be conducted elsewhere, possibly on a global scale. The phenomenon is too important to be ignored.

Lawrence says the instrumentation tape, as a mere audio presentation, is unpleasant to listen to, but reviewers of the tape have conceded that 'a fascinating degree of enchantment' tends to emerge after the tape has been played back three or more times, typically over a period of weeks

The tape contains a short, incremental series of deep harmonious oscillations resembling nonsense chatter or background modulations. An intelligent character of the overall pulse train is implied by discrete spacing patterns, apparent repetitions of sequences, and highly attenuated electromagnetic noise

Lawrence's most important conclusion that biological type sensors are needed in order to intercept biological signals applies particularly to communications from outer space. As he puts it: 'Standard electronics are next to worthless here, since "bio-signals" apparently reside outside the known electromagnetic spectrum.'

Lawrence points out that in the 1950s scientists who had previously insisted that our small planet was unique in the universe began, on the basis of careful celestial observations and other inferences, to admit that we may not be alone in the cosmic immensity, and to concede the possible existence of extraterrestrials whose development might be far superior to our own.

In the early nineteenth century Karl Friedrich Gauss, the German mathematician and physicist, proposed that man might make known to cosmic beings his presence on earth by cutting huge swathes hundreds of miles long in the Siberian taiga to form a right angle. This was followed by the suggestion of the Austrian astronomer, J. J. von Littrow, that geometric

canals be dug in the Sahara, filled with kerosene and set aflame at night, and the recommendation of the French Scientist Charles Gros that a vast mirror be built to reflect sunlight directly at Mars.

These far-fetched ideas were updated when, in the summer of 1927, Jorgen Hals, a Norwegian radio engineer, was listening to short wave station P.C.J.J. transmitting from Eindhoven in the Netherlands and heard strange echoes. Only a quarter of a century later were these echoes finally considered to derive from the possible existence of a communications probe sent from afar to transmit and monitor the solar system for intelligent life and retransmit live radio-frequency emanations back to its distant 'home-world'.

In September 1953, C. W. Bradley of London picked up the call letters of the American station KLEE-TV in Houston, Texas, on his living-room television tube. Over the next several months the same letters were observed on TV screens in the offices of Atlantic Electronics Ltd in Lancaster. What was eerie about these receptions was not that the TV signal had been sent from so far away, since this happens often enough to cause no surprise, but that the signal had been sent about three years prior to the time of its reception, the call letters KLEE having been changed to KPRC in 1950. Explanations that the signals could have been stored in a 'plasma cloud' hovering above the earth which released the data in a broadcast for all to see gave no reasons as to how this could have been done or why, and suggestions that the whole thing was merely a meaningless – though extremely expensive – hoax seem far-fetched.

That scientists are still hotly pursuing the subject of communication with extraterrestrial intelligences, shortened into the acronym CETI, is evidenced by a top-level international conference held in September 1971 at the Byurakan Astrophysical Laboratory in Soviet Armenia. Sponsored by the science academies of the U.S.A. and the U.S.S.R., the conference was attended not only by astronomers but by biologists, anthropologists, historians and cryptographers.

Most of their projects, Lawrence complains, assume that signals must come by radio since that is the most efficient

means of communication known to the scientists of this planet. If they became converted to his idea of receiving biological signals, Lawrence feels they would have a much better chance. The notion is echoed by Joseph F. Goodavage, author of *Astrology, The Space Age Science*, who, in an article for *Saga* magazine (January 1973), states that:

> Rigid enforcement of established Scientific Method, as a kind of quasi-religion – with its burdensome ritual and tradition – may be the most serious obstacle in the path of direct communication between *Homo sapiens* and other civilizations that may be thriving throughout interstellar, intergalactic space.

Employed as an instrumentation engineer for a Los Angeles space-science corporation, Lawrence decided to design some more sophisticated transducers – or converters of one type of input energy into another type of output energy. Knowing that a mechanical device which could use heat, environmental pressure, electrostatic fields, and gravitational changes simultaneously was not up to the task, he theorized that a plant might be able to turn the trick because it had the necessary components built in by nature.

When he began to study the problem in 1963, Lawrence found he could get no help from plant specialists and biologists because none of them knew enough physics, and especially electronics, to visualize what he was driving at. In his search for a biological system for radiating and receiving signals, Lawrence began by going over the experiments made in the 1920s by the Russian histologist Alexander Gurwitsch and his wife, who proclaimed that all living cells produce an invisible radiation. Gurwitsch had noticed that the cells in the tips of onion roots seemed to be dividing at a definite rhythm. Believing this due to an extra unexplained source of physical energy, Gurwitsch wondered whether it might not come from nearby cells.

To test out his theory he mounted one root tip in a horizontally oriented thin glass tube to act as a ray gun. This he pointed at a similar onion root tip, also protected in a tube, but with a small area on one side exposed naked to serve as a target. After three hours of exposure, Gurwitsch examined sections from the target root under his microscope. When he

compared the number of cell divisions, he found twenty-five per cent more in the exposed, irradiated area. The receiver root had seemingly picked up a vital energy from its sender neighbour.

To try to block the emission, Gurwitsch repeated the experiment with a thin shield of quartz between the roots, but obtained essentially the same results. However, when the quartz was coated with gelatine, or a simple sheet of glass was substituted, no enhanced cell division could be observed. Since glass and gelatine were known to block various ultra-violet frequencies on the electromagnetic spectrum, Gurwitsch concluded that the rays emitted by the cells of an onion root tip must be as short as or shorter than ultra-violet. Because they apparently increased cell division, or 'mitosis', he called them 'mitogenetic rays'.

Gurwitsch's findings had created a furore in the scientific world as laboratories hastened to check them. Since the wave-lengths claimed for the new rays were more powerful than the ultra-violet frequencies which reach the earth from the sun, many biologists could not believe that living processes were capable of generating them In Paris two researchers reported similar results, in Moscow one of Gurwitsch's own countrymen showed that he could increase the budding of yeast more than twenty-five per cent by exposing it to 'mitogenetic' rays from onion roots

A pair of scientists at the Siemens and Halske Electric Company near Berlin came to the verdict that the radiation was a fact; and in Frankfurt, a researcher actually succeeded in measuring it, not through its effect on vegetal life, but with electrical instruments. On the other hand, equally reliable Anglo-Saxon investigators could detect no effects. In the United States, when the prestigious Academy of Sciences issued a report that Gurwitsch's discovery was not replicable, and therefore strongly suggested it might be the product of his imagination, Gurwitsch was sped into limbo.

Though Lawrence lacked an ultra-violet spectrometer to detect 'mitogenetic' radiation, he was fascinated by Gurwitsch's system of *directing* the energy His observations also nudged Lawrence almost involuntarily to the position that there was a psychological, or 'mental', factor involved in Gurwitsch's

maverick work. Continuing to probe further with a sensitive high-impedance device of his own design, Lawrence sought to discover whether individual cells in a quarter-inch slice of onion, attached to a Wheatstone bridge and an electrometer, would react to various stimuli. He found that they seemed to respond to irritations such as a puff of smoke, or even to his mental image of their destruction, in about one hundred milliseconds, or one tenth of a second.

What seemed most odd to Lawrence was that the reaction of the onion tissue seemed to change depending on whether he, or someone else, was directing thought at it. People with 'psychic gifts' seemed to elicit much stronger responses than the practical-minded Lawrence. As he commented: 'If one can cause, or get something to cause, harm to a cell – assuming that the cell has a cellular consciousness – the reaction pattern in it will change from experimenter to experimenter.'

It was when Lawrence came across Backster's work that he decided to build a sophisticated psycho-galvanic analyser or plant response detector. With his new equipment, he got a series of 'wild' tracings from his plants, but because of what he retrospectively calls his 'ignorance and classical Prussian orthodoxy', he ascribed these effects to faults in his instrumentation. Nevertheless, his suspicion that plant tissues could pick up human thought and emotion slowly became more concrete in the light of Backster's achievements.

During his appointment as an assistant professor and Director of Audio-Visual Services at the California State College at San Bernadino, Lawrence attracted the attention of a sociologist colleague, Dr Mary Cisar. Because one of her best-loved house plants had mysteriously died, Lawrence purchased a philodendron for her and asked her to cooperate on some experiments with him after she had lived with it for a few weeks. When Dr Cisar made a flying trip to visit her father, Lawrence was able to note, with the help of synchronized watches, that her plant responded at certain times of day whenever she became excited or anxious. Though this seemed to confirm similar observations of Backster's, Lawrence's cautiousness still inclined him to believe that they might be due to 'bugs' in his instruments.

In October 1969, Lawrence began to publish a series of popular articles based on his reading and research, the first of which appeared as 'Electronics and the Living Plant' in *Electronics World*. Lawrence told his readers that, for the first time in the millennia since the first green leaves poked their heads out of Paleozoic swamps, plants were at last beginning to be studied for their 'electrodynamic properties'.

Four main questions, said Lawrence, were starting to attract serious attention: Could plants be integrated with electronic read-outs to form major data sensors and transducers? Could they be trained to respond to the presence of selected objects and images? Were their alleged supersensory perceptions verifiable? Of the 350,000 plants species known to science, which were the most promising from the electronic point of view?

Providing detailed instructions for investigating the behaviour of living plant cells with micro-electrodes, Lawrence also reported that in the 'Moon Garden' at Farmingdale, New York, scientists had been able in the 1960s to induce what appeared to be 'nervous breakdown' and 'complete frustration' in plants being tested as possible space foods. Even earlier, he said, L. Ron Hubbard, founder of Scientology, had noted in his East Grinstead laboratory that a tomato pricked on one side shuddered on the other.

Lawrence warned his readers that work with plants was not just a matter of electronic expertise and that working with the Backster Effect involved much more than the mere ability to construct top quality electronic equipment. 'There are certain qualities here,' he wrote, 'which do not enter into normal experimental situations. According to those experimenting in this area, it is necessary to have a "green thumb" and, most important, a genuine love for plants.'

Half a year later Lawrence followed up his revelations with an even more controversial article in the same magazine. Entitled 'Electronics and Parapsychology', Lawrence's article began by asking: 'Does man possess latent sensitivities that have been stifled by modern communications systems?' He then pointed out that although the fledgling science of parapsychology, long suspect because of an occult background,

was having to fight for acceptance, the application of electronic instruments was not only permitting dramatic new experiments and bringing forth stunning discoveries but might in time rival the orthodox communications arts and sciences currently in use.

Stressing that the need for machine systems, capable of testing ESP in an unbiased, impartial manner had been recognized fifty years ago when an Italian scientist, Federico Cazzamalli, developed an ultra-high-frequency apparatus for testing human telepathy, Lawrence reported that the Italian's experiments had never been repeated because the Fascist dictator, Benito Mussolini, had declared the work secret.

In yet another article, this time in the June 1971 issue of *Popular Electronics*, Lawrence provided any researcher wishing to investigate communication with plants with detailed diagrams and a parts list for a 'response detector' allowing for extremely sensitive tests. Warning that constant repetition was an important factor in such testing, Lawrence stated that if a plant specimen is stimulated continuously, badly injured, or infrequently watered, it would tire quickly, or even lapse into shock and die. Researchers were therefore cautioned to be gentle with their plants and allow them to rest after experiments. The area in which plants live must be quiet, he added, 'so that the stimuli can be effectively applied with a minimum of power-line noise or disturbances from radio frequency transmission to cause faulty indications'.

Lawrence's ideas about plants were corroborated and elaborated upon by Jan Merta, a Czech publisher and student of physiological psychology, whose psychic gifts allow him to plunge an iron bar into a blacksmith's forge, heat it to incandescence, then calmly brush sparks off its white-hot end with his bare hand as easily as he would rub dust from a shelf. Freshly settled in Canada, Merta supported himself for two months by working as a troubleshooter for a large Montreal grower and importer of tropical plants. When clients in office and residential buildings complained that their plants were getting sick, Merta was sent to find out what was wrong. He often noticed the marked difference between the thousands of healthy plants in the firm's extensive greenhouses, and the

languishing appearance of a single plant when it was taken away. Shock and loneliness were apparently cause enough for it to pine and in some cases to die. However, plants that were returned to the greenhouses would immediately regain their normal lush health

As the result of hundreds of 'house-calls', Merta also noticed that plants thrived better when constantly communicated with by office workers and home owners than if left to themselves. Examples of the majestic *Ficus benjamini*, some nearly thirty feet tall, transported from Florida, though in excellent condition upon arrival, when placed around a fountain in a shopping centre's indoor circular solarium, started to wilt within two days in spite of careful watering and feeding. Yet those in heavily travelled passageways leading to the solarium retained their radiant vigour To Merta this was a sure sign that the *Fici* enjoyed being admired by the passers-by.

In 1970, when Lawrence read that in the Ukraine radio frequencies and ultrasonic vibrations had been used to stimulate cereal grain seeds to produce higher yields as far back as the early 1930s and that the United States Department of Agriculture had successfully experimented in the same way, he gave up his college position and set about independently developing advanced equipment with which he hopes that seed grains can be provoked, on a commercial scale, to grow better and faster. 'If a plant seedling can be stimulated on a parapsychological basis, as the famous plant breeder Luther Burbank knew, then I don't see why,' says Lawrence, 'we can't transmit specific signals to whole fields of crops to stimulate their growth without all these damned soil-killing fertilizers.'

He began to work on special sound-type plant stimulation techniques which he combined with Backster Effect methods in order to stimulate his plants in a wireless fashion. Lawrence, torn between his interest in stimulating plant growth electrically and his projects to achieve interstellar communication, feels that the effort to contact extraterrestrial life is more important in the long run because 'if routine results can be achieved in CETI, many questions attached to riddles in the plant kingdom will be answered as a consequence'.

Visitors from outer space

On 5 June 1973, the research division of Anchor College of Truth in San Bernardino announced that it was inaugurating the world's first biological-type interstellar communications observatory under the direction of L. George Lawrence, now also a vice-president of Anchor. For the new research programme Lawrence has designed what he calls a Stellartron, which combines in one three-ton instrument the features of a radio telescope and the biological signal-receiving system of the biodynamic field station.

Anchor president, Ed Johnson, told the press that since radio astronomy had failed to detect intelligent signals from space, the college was backing Lawrence's idea that radio transmission was out of date and that biological communication should be given a trial.

Pointing out that in our own galaxy alone there are some 200 billion stars, Lawrence says that if one assumed each of them to have at least five companion planets, a total of one trillion might consequently be available for study. Even if only one planet in a thousand has intelligent life this would amount to one billion in our galaxy alone. Multiplied by the ten billion galaxies believed to comprise the observable universe, then there may be 10,000,000,000,000,000,000 planets capable of sending some kind of signal to Earth.

Anchor's founder, Reverend Alvin M. Harrell, thinks that contact with another race in the universe will trigger a tremendous explosion of knowledge. As Harrell says: 'Given the destructive brutality of humankind, we may expect any newly discovered civilization to be infinitely more loving and compassionate than we are.'

Lawrence observes that:

> Perhaps plants are the true extraterrestrials for they converted an early mineral world into a habitat suitable for man by processes that border on near-perfect magic! What remains to be done now is to remove all traces of occultism and make plant response, including communications phenomena, a verifiable component of orthodox physics. Our instrumentation concepts reflect this effort.

If Lawrence is on the right track, the ardently desired prospect of producing hardware to move man into the vastness

of interstellar space on Columbian voyages of discovery will be rendered as obsolete as Columbus's flagship, *Santa Maria*. Lawrence's research, suggesting as it does that intelligences are communicating instantly across distances requiring millions of light-years to reach, indicates that what is needed is not spaceships but the proper 'telephone numbers' to contact them. Though the work is still in an exploratory stage, his bio-dynamic field station may be a step towards plugging into the universal switchboard, with plants as the pretty, cheerful and efficient co-operators.

5

Latest Soviet discoveries

Recent interest and experiments in communication with plants have not been limited to the United States. Millions of newspaper readers in the U.S.S.R. were introduced to the ideas that plants communicate their feelings to man in October 1970 when *Pravda* published an article entitled, 'What Leaves Tell Us'. 'Plants talk . . . yes, they scream,' declared the official organ of the Communist Party. 'It only *seems* that they accept their misfortunes submissively and silently bear pain.' *Pravda*'s reporter, V. Chertkov, tells how he witnessed these extraordinary goings-on for himself when he visited the Laboratory for Artificial Climate at the renowned Timiryazev Academy of Agricultural Sciences in Moscow.

> Before my eyes a barley sprout literally cried out when its roots were plunged into hot water. True, the plant's 'voice' was registered only by a special and extremely sensitive electronic instrument which revealed a 'bottomless vale of tears' on a broad paper band. As though it had gone crazy, the recording pen wriggled out on the white track the death agony of the barley sprout, although, to look at the little plant itself, one would never have guessed what it was going through. While its leaves, green as ever, stood upright, the plant's 'organism' was already dying. Some kind of 'brain' cells within it were telling us what was happening.

Pravda's reporter also interviewed Professor Ivan Isidorovich Gunar, head of the Academy's Department of Plant Physiology, who, with his staff, had performed hundreds of experiments, all of which confirm the presence of electrical impulses in plants similar to the well-known nerve impulses in man. The *Pravda* article noted that Gunar talked about plants as he would about people, distinguishing their individual habits, characteristics and proclivities. Chertkov wrote that,

He even appears to converse with them, and it seems to me that his plants pay attention to this good, greying man. Only persons invested with certain power are like this. I have even been told of a test pilot who talked to his misbehaving aeroplane, and I myself have met an old captain who talked with his ship.

When Gunar's chief assistant, Leonid A. Panishkin, a former engineer, was asked by the *Pravda* reporter why he gave up the technology in which he was trained in order to work in Gunar's laboratory, he replied: 'Well, there I used to be involved with metallurgy; here there is life.' He said he was particularly interested in searching out those conditions which might best suit the specific needs of plants and how they react to light and darkness. By using a special lamp which shone with the same intensity as the sun he had found that plants tired in an over extended day and needed rest at night. He hoped that it might one day be possible for plants to turn lights on or off in a greenhouse at will. According to *Pravda*, when the roots of Panishkin's beans were chilled, then warmed with hot water, the recording pen did not immediately indicate a reaction, as if the plant was 'remembering' the cold, and was somewhat loath to respond. This had convinced the researcher that there really were elements of memory in vegetal life.

The studies of the Gunar team may open up new vistas in plant breeding since in their laboratory it has been found that individual plants more resistant to heat, cold and other climatological factors can be selected within minutes by testing them with their instruments, although these qualities have heretofore taken geneticists years to establish.

In the summer of 1971, an American delegation from the Association for Research and Enlightenment (A.R.E.), founded by the seer and healer Edgar Cayce at Virginia Beach, Virginia, visited the U.S.S.R. The Americans – four medical doctors, two psychologists, one physicist and two educationists – were shown a film by Panishkin entitled *Are Plants Sentient?* The film demonstrated effects produced on plants by environmental factors such as sunlight, wind, clouds, the dark of night, the tactual stimulus from flies and bees, injuries produced by chemicals and burning, and even the very proximity of a vine to a structure to which it might cling. The film showed

further that the immersion of a plant in chloroform vapour eliminates the characteristic biopotential pulse normally apparent when a leaf is given a sharp blow; it also indicated that the Russians are now studying the characteristics of these pulses to establish the relative degree of a plant's health. One of the doctors, William McGarey, stated in his report that the intriguing part of the film was the method used to record the data. Time-lapse photography made the plants seem to dance as they grew. Flowers opened and closed with the coming of darkness as if they were creatures living in a different time zone. All injury-induced changes were recorded by sensitive instruments from a polygraph attached to the plants.

In April 1972, *Weltwoche*, a Swiss newspaper published in Zurich, came out with an account of both Backster's and Gunar's work which it said had taken place simultaneously and independently. That same week the Swiss article was translated into Russian in a weekly review of the foreign press, *Za Rubezhom* (Abroad), published in Moscow by the U.S.S.R.'s Union of Journalists, under the caption: 'The Wonderful World of Plants'. These scientists, said the Russian version, are

> proposing that plants receive signals and transmit them through special channels to a given centre where they process the information and prepare answering reactions. This nervous centre could be located in root tissues which expand and contract like heart muscle in man. The experiments showed that plants have a definite life-rhythm and die when they don't get regular periods of rest and quiet.

The *Weltwoche* article also caught the attention of the editors of the Moscow newspaper *Izvestia* who assigned their reporter M. Matveyev to write a story for the paper's weekly magazine supplement. Although the reporter referred to Backster's suggestion that plants might have memory, language and even rudiments of altruism, he strangely omitted Backster's most startling discovery that his philodendron had perceived his *intent* to harm it. Deciding that a 'sensation was being propagated in western newspapers', Matveyev travelled to Leningrad where he interviewed Vladimir Grigorievich

Karamanov, Director of the Laboratory of Biocybernetics of the Institute of Agrophysics, in order to get an authoritative opinion.

The Institute of Agrophysics was founded over forty years ago at the behest of the renowned solid-state physicist, Academician Abram Feodorovich Ioffe, who became particularly interested in the practical application of physics to the design of new products, first in industry, then in agriculture. After the institute opened its doors, Karamanov, then a young biologist, was inspired by Ioffe to familiarize himself with the world of semiconductors and cybernetics and, in due course, began building microthermisters, weight-tensometers and other instruments to register the temperature of plants, the flow-rate of fluid in their stems and leaves, the intensity of their transpiration, their growth rates and characteristics of their radiation. He was soon picking up detailed information on when and how much a plant wants to drink, whether it craves more nourishment or feels too hot or cold. In the first issue of *Reports of the U.S.S.R. Academy of Sciences* for 1959, Karamanov published 'The Application of Automation and Cybernetics to Plant Husbandry'.

According to the *Izvestia* reporter, Karamanov showed that an ordinary bean plant had acquired the equivalent of 'hands' to signal to an instrumental brain how much light it needed. When the brain sent the 'hands' signals, 'they had only to press a switch, and the plant was thus afforded the capability of independently establishing the optimal length of its "day" and "night".' Later, the same bean plant, having acquired the equivalent of 'legs' was able instrumentally to signal whenever it wanted water. 'Showing itself to be a fully rational being,' the account continued, 'it did not gulp down the water all at once but limited itself to a two-minute drink each hour, thus regulating its need for water with the help of an artificial mechanism.'

'This was a genuine scientific and technical sensation,' concluded the *Izvestia* reporter, 'a clear demonstration of twentieth-century man's technical abilities.'

Asked whether he thought Backster had discovered something new, Karamanov somewhat disparagingly replied:

'Nothing of the sort! That plants are able to perceive the surrounding world is a truth as old as the world itself. Without perception, adaptation does not and cannot exist. If plants had no sense organs and didn't have a means of transmitting and processing information with their own language and memory, they would inevitably perish.'

Karamanov, who throughout the interview made no comment on plants' ability to perceive human thought and emotion – Backster's real and truly sensational discovery – and seemingly oblivious to Backster's success in getting his philodendron to recognize a 'plant assassin', rhetorically asked the *Izvestia* reporter: 'Can plants discern shapes? Can they, for instance, differentiate between a man who causes them hurt and another who waters them?' Replying to his own question, while at the same time putting Backster into what he considered to be a proper perspective for Soviet readers, Karamanov said:

'Today I cannot answer such a question. And not because I doubt that Backster's experiments were immaculately set up and repeatedly performed (though perhaps a door slammed, or a draught wafted into the room, or something else). The fact is that neither he, nor we, nor anyone else in the world is yet ready to decipher *all* plant responses, hear and understand what they "say" to one another, or what they "shout at us".'

Karamanov also predicted that in the long run it would be possible cybernetically to direct all the physiological processes of plants, not, as he put it, 'for the sake of sensation, but for the advantage of plants themselves'. When, with the help of electronic instruments, plants are able to auto-regulate their environment and establish the best conditions for their own growth, this should be also a long step towards larger harvest of cereal grains, vegetables and fruits. Making clear that the achievements were not just around the corner, he added, 'we are not just learning to talk with plants and understand their peculiar language. We are working out criteria which will help us to control the life of plants. Along this difficult but fascinating road, a multitude of surprises still await us.'

The *Izvestia* article was followed that summer by a story in